FLUID HEATERS, e.g. WATER OR AIR HEATERS, HAVING HEAT GENERATING MEANS, IN GENERAL (heat-transfer, heat-exchange or heat-storage materials C09K 5/00; tube furnaces for thermal non-catalytic cracking C10G 9/20; devices, e.g. valves, for venting and aerating enclosures F16K 24/00; steam traps or like apparatus F16T; steam generation F22; combustion apparatus F23; domestic stoves or ranges F24B, F24C; domestic- or space-heating systems F24D; furnaces, kilns, ovens, retorts F27; heat-exchangers F28; electric heating elements or arrangements H05B)

NOTES

1. The distinguishing feature of the air heaters covered by this subclass is that the heat is predominantly released to the air by convection, mostly by forced circulation of the air. The domestic stoves or ranges covered by subclasses F24B, F24C may also be fired or electric air heaters but they release their heat to a considerable extent by radiation and only to some extent by natural convection.

2. In this subclass the following terms are used with the meanings indicated:
   • “Water” includes other liquids;
   • “air” includes other gases or gas mixtures;
   • “water” and “air” always mean, respectively, the liquid and gas to be heated;
   • “Furnace tubes” means tubes inside the heater wherein combustion is performed;
   • “Fire tubes” means tubes inside the heater through which flue-gases flow from a combustion chamber located outside the tubes;
   • “Heater” means apparatus including both heat generating means and means for transferring the generated heat to water or air.

3. All storage heaters are classified in group F24H 7/00.

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.
heating (F24H 1/50 storage heaters, e.g. water-heaters for central takes precedence)

Water storage heaters (combined with water-heating stoves for central heating F24H 1/22; F24H 1/50 takes precedence)

(Construction of the tank (containers or tanks in general B65D, e.g. metal containers B65D 7/00))

Insulation (containers with thermal insulation in general B65D 81/38)

Inner linings (linings for containers in general B65D 25/14, B65D 90/04)

(using electric energy supply (F24H 1/201 takes precedence))

(using fluid fuel)

(using solid fuel)

(with means for compensating water expansion)

with immersed heating elements, e.g. electric elements or furnaces tubes

(using electric energy supply)

(with resistances)

(with electrodes)

(with furnaces tubes)

(with submerged combustion chamber)

(with water tubes)

(with tubes filled with heat transfer fluid)

Water heaters other than continuous-flow or water storage heaters, e.g. water-heaters for central heating (F24H 1/50 takes precedence)

Water heaters with water mantle surrounding the combustion chamber or chambers (F24H 1/40, F24H 1/44 takes precedence)

the water mantle forming an integral body

including one or more furnace or fire tubes

(with flue gas passages built-up by coaxial water mantles)

(with the fire tubes arranged built-up by coaxial water mantles)

(with the fire tubes arranged alongside the combustion chamber)

(with the fire tubes arranged in line with the combustion chamber)

the water mantle being built up from sections

with vertical sections arranged side by side

with water chamber adjusted to the combustion chamber or chambers, e.g. above or at side (F24H 1/24, F24H 1/44 take precedence)

the water chamber including one or more fire tubes

with water contained in separate elements, e.g. radiator-type element (F24H 1/40, F24H 1/44 take precedence)

with water tube or tubes (F24H 1/44 takes precedence)

the water tubes being arranged in one or more circles around the burner

the tubes forming a membrane wall

in serpentine form

heated by the burner

Heat exchangers for sanitary water directly heated by the burner)

Pipes in pipe heat exchangers for sanitary water)

Air heaters having heat generating means (F24H 7/00, F24H 8/00 take precedence; details F24H 9/00; domestic stoves or ranges with additional provisions for convection heating of air F24B, F24C)

(using electric energy supply)

(with a closed circuit for a heat transfer liquid)

(using fluid combustibles)

(using solid combustibles)

with forced circulation (F24H 3/12 takes precedence)

(using electric energy supply)

(using fluid combustibles)

(using solid combustibles)

the air being in direct contact with the heating medium, e.g. electric heating element

using electric energy supply, e.g. the heating medium being a resistive element; Heating by direct contact, i.e. with resistive elements, electrodes and fins being bonded together without additional element in-between (F24H 3/06, F24H 3/08, F24H 3/10 take precedence)

(for domestic or space-heating systems)

(portable or mobile)

(hand-held air guns)

(For vehicles)

[Structures comprising heat spreading elements in the form of fins]

[Interfaces between the electrodes of a resistive heating element and the power supply means]

[Forms of the electrode terminals, e.g. tongues or clips]

[Frame constructions]

[One-piece frames]

[Two-piece frames, e.g. two-shell frames, also including frames as a central body with two covers]

[Multiple-piece frames assembled on their four or more edges]

[Means for putting the electric heaters in the frame under strain, e.g. with springs]

[Frames with integrated fan]

[using fluid combustibles]

[using solid combustibles]
Details
9/005  [for water heaters]
9/001  [Guiding means]
9/0015  [in water channels]
9/0021  [Sleeves surrounding heating elements or heating pipes, e.g. pipes filled with heat transfer fluid, for guiding heated liquid]
9/0026  [in combustion gas channels]
9/0031  [with means for changing or adapting the path of the flue gas]
9/0036  [Dispositions against condensation of combustion products]
9/0042  [Cleaning arrangements]
9/0047  [Protection against galvanic corrosion, e.g. cathodic protections, electrolytic protections]
9/0052  [for air heaters]
9/0057  [Guiding means]
9/0063  [in air channels]
9/0068  [in combustion gas channels]
9/0073  [Arrangement or mounting of means for forcing the circulation of air]
9/0078  [for storage heaters]
9/0084  [Combustion air preheating]
9/0089  [by double wall boiler mantle]
9/0094  [having means for transporting the boiler]
9/02  Casings; Cover lids; Ornamental panels
9/06  Arrangement of mountings or supports [for heaters, e.g. boilers, other than space heating radiators (space heating radiators F24D 19/02)]
9/12  Connecting heaters to circulation pipes (pipe joints in general F16L)
9/122  [for water heaters]
9/124  [storage heaters]
9/126  [Arrangement of inlet valves used therewith (valves per se F16K)]
9/128  [continuous flow heaters]
9/14  Connecting different sections, e.g. in water-heaters (in radiators F24F 9/26)
9/142  [Connecting hydraulic components]
9/144  [Valve seats, piping and heat exchanger connections integrated into a one-piece hydraulic unit]
9/146  [Connecting elements of a heat exchanger]
9/148  [Arrangements of boiler components on a frame or within a casing to build the fluid heater, e.g. boiler]
9/16  Arrangements for water drainage (valves for drainage F16K, e.g. F16K 21/00; in pipes or pipe systems in general F16L 55/00; in domestic- or space-heating systems F24D 19/08)
9/165  [Devices for retaining leaking fluid from heaters]
Arrangement or mounting of grates, burners, or heating elements (burners F23D; grates F23H; electric heating elements H05B)

[for water heaters]

[electric heating means]

[PTC Positive temperature coefficient resistor]

[fluid combustible heating means]

[solid combustible heating means]

[for air heaters]

[electric heating means]

[PTC Positive temperature coefficient resistor]

[fluid combustible heating means]

[solid combustible heating means]

Arrangement or mounting of control or safety devices {or methods} (control valves F16K; safety devices for burners F23D; combustion control devices F23N; of systems comprising a heater, see the relevant subclasses, e.g. of control heating systems F24D 19/10; automatic switching for electric heating apparatus H05B 1/02)

[for water heaters]

[for heaters using electrical energy supply]

[Storage heaters]

[Continuous-flow heaters]

[for heaters using fluid combustibles]

[Preventing or detecting the return of combustion gases]

[Closing the energy supply]

[for heaters using solid combustibles]

[for air heaters]

[for heaters using electrical energy supply]

[storage heaters]

[for heaters using fluid combustibles]

[for heaters using solid combustibles]

** to be deleted **

Burner and heat exchanger are integrated

Measures for environmentally correct disposal

Solid fuel fired boiler

Solid and fluid fuel fired boilers

Fluid heaters having electrical generators

Batteries, electrical energy storage device

with combustion engines

External combustion engines

Internal combustion engines

with peltier elements

with photovoltaic cells

with fuel cells

with thermodynamic cycle for converting thermal energy to mechanical power to produce electrical energy

Stirling cycles

Carnot cycles

Rankine cycles, e.g. steam heat engines

Electrical heat generating means

Resistances

Positive or negative temperature coefficients, e.g. PTC, NTC